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“Knowledge is such a treasure which cannot be stolen”

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Indian Standard
GLOSSARY OF TERMS
RELATING TO INKS AND ALLIED INDUSTRY
(*First Revision*)

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Indian Standard

GLOSSARY OF TERMS RELATING TO INKS AND ALLIED INDUSTRY (First Revision)

Inks and Allied Products Sectional Committee, CDC 13

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(Continued on page 2)

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Indian Standard

GLOSSARY OF TERMS RELATING TO INKS AND ALLIED INDUSTRY (*First Revision*)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 16 February 1987, after the draft finalized by the Inks and Allied Products Sectional Committee had been approved by the Chemical Division Council.

0.2 The glossary of terms relating to inks have been covered by IS : 4395-1967* and IS : 4724-1968†. This revision has been brought up as an amalgamated revision of these standards. Opportunity has been taken to review the various terms and make them up-to-date with their usages, etc. Several newer terms have also been added in this revision.

1. SCOPE

1.1 This standard covers the terms and definitions that are prevalent in ink and allied industries.

2. TERMS AND DEFINITIONS

Abrasive Quality — The quality of substance to rub or grind down surfaces.

Abrasiveness — This is the capacity of a substance to disintegrate an exposed surface by wearing it away mechanically.

Absorption — Process by which a liquid is sucked into a porous surface.

Absorption Drying — The process of drying due to the absorption of the medium in the absorbant substrate.

*Glossary of terms relating to ink and allied industries.

†Glossary of terms relating to printing inks and allied industries.

Acetyl Value — Number of milligrams of potassium hydroxide required to neutralize the free acid present in one gram of the material under the prescribed condition.

Acid Dyes — A group of dyes, salts of organic acids, used chiefly for dyeing wool and natural silk.

Acid Free Paper — Paper which does not contain any free acid or a paper having a pH value of not less than 6.

Acid Value — Number of milligrams of potassium hydroxide required to neutralize free acidity in one gram of the substance.

Acidity of Paper or Board — A water extract of the paper or board with a pH below 5.0. Such paper and board is prone to cause ink drying problems.

Additive — A chemical compound added in small proportions to improve the performance of an ink.

Additive Process — The process of forming any colour by a mixture of red, green and blue colours. The colours add together to form a new colour; the colour obtained depending on the properties of each additive primary colour. Equal proportions give white light.

Adhesion — The degree of attachment between an ink and underlying material which may be another ink or a substrate like paper, board, cellulosic and synthetic films, foil, metal, etc.

Adsorption — Adherence of atoms, ions or molecules of a gas or liquid to the surface of another substance.

Aeration — Agitation of ink by blowing air.

After Tack — The tackiness present in an applied ink after normal drying period.

Ageing — The change on storage in physical characteristics of a substance, namely, ink, paper, board, media, etc.

Agglomerates — A cluster of undispersed particles which are formed when the pigment has dried up.

Aggregate — Primary pigment particles, when firmly attached face to face with each other, become aggregates. Aggregates are difficult to break but can be broken up by suitable dispersion technique.

Alkali Resistance — The resistance of a pigment or a print to bleed into a solution of alkali of a specified concentration and at room temperature.

Alkalinity of Glass Bottles — A measure of the alkali extracted from the glass powder expressed as millilitres of 0.01 N hydrochloric acid required to titrate the alkali extracted from 5 g of glass powder under specified conditions.

Alkyd Resins — Polymers having a large molecular structure and are produced by reaction of polybasic acids with polyhydric alcohols/or chemically interacted with natural or synthetic resins, fatty acids, oils, reactive chemicals, monomers, etc.

Alkylated Urea Formaldehyde Resin and Alkylated Melamine Formaldehyde Resins — They are widely used in lacquers where chemical inertness of the finished film is essential. Alkylated MF resins have slightly better chemical, heat and water resistance.

Aluminium Pigment — Aluminium powders or pastes which have high hiding power, leafings/non-leafings alone or with colours to produce a silvery metallic colour effect.

Aniline Inks — Solutions of a coal-tar dyestuff in an organic solvent, such as alcohols, esters, ketones and ethers.

Aniline Point or Aniline Number — The lowest temperature at which equal parts of aniline and the liquid under test are just completely miscible. It is an arbitrary figure used with petroleum products as a measure of degree of the aromatics present.

Antifungal Agent — Substance that prevents the growth of fungi.

Anti-Oxidants — Substances, when present in small quantities, retard oxidation.

Ash Content — The amount of the incombustible residue left over after the complete combustion of any substance. It consists of non-volatile, inorganic constituents of the substance.

Attritor — A pigment dispersion equipment, in which the dispersing medium is moved by means of agitation, operated by a central vertical spindle provided with perpendicular horizontal shafts in a vertical, stationary cylindrical chamber provided with a water jacket. Low viscosity inks are normally made.

Backing Away — The tendency of an ink not to flow freely nor to maintain contact with the duct roller.

Ball Mill — A horizontally revolving cylindrical mill which uses steel balls, stones or other media to grind or disperse the pigment in the vehicle.

Banbury Mixers — Banbury mixers are twin blade Z-arm ink premixers.

Base — In ink manufacture, a base is an ink containing usually only one colouring matter, pigment or dye, properly dispersed or dissolved in a vehicle.

Bead Mill — They are based on principle of attritor. The smaller size of grinding media like steel, glass or porcelain beads, etc, used, lead to very efficient pigment dispersion due to the greater number of contact points.

Binder — The material in an ink film that holds the pigment to the printed surface after drying.

Bleaching — Removing the colour from coloured materials by chemically changing the dyestuff into colourless substances.

Bleeding — A condition which exists when the colour of a dye, stain or pigment passes through the top coat producing a stain. It occurs when the pigment is somewhat soluble in the vehicle of the top coat.

Bleeding on Press — Light or faint tint of colour run appears on unprinted areas of paper after press has been in operation for some time. Dampening rollers and fountain solution eventually become strongly coloured with the ink being run.

Blinding — In lithography, this problem occurs in the image area of the plate. The image area becomes overlaid with water, giving a reduction or 'sharpening' of the image size. This fault is also referred to as plate 'blinding'.

Blocking — In flexographic or gravure printing, blocking occurs when subsequent layers of printed roll stick together. In extreme cases forming a 'block' or solid cylinder.

Bloom — A thin whitish film which sometimes forms on a glossy printed surface, thereby diminishing its lustre or veiling its depth of colour.

Blown Oils — These are produced by blowing large volumes of air through the vegetable oil at 100-140°C. They are fast drying with higher viscosity and have improved wetting, dispersion and flow qualities.

Blue Wool Scale — A gradation of standard patterns of woollen cloth especially dyed to match a master set of standards, in colour and fading behaviour, with certain acid dyestuffs and solubilized vat dyestuffs. It is meant for assessment of light fastness. Its scale is numerically coded 1 (very low light fastness) to 8 (very high light fastness).

Blurred Prints — The process of haloing and feathering. This may be due to various reasons as poorly dispersed pigments in the ink, the ink being used at incorrect consistency, etc.

Blushing — The process of the prints dimming and loosening their brilliance due to moisture trapped in the film of ink.

Bodied Oil — Heat polymerized vegetable oils having higher viscosity. These are also generally known as stand oils.

Body — The viscosity, consistency, length or flow of an ink or varnish.

Bond Paper — It is a strong, thin paper, made of rags, asparto, straw and wood or various mixtures of these constituents and are always tub-sized. They are used for personal and commercial stationery.

Breaking Length — *see* 'Tensile strength'.

Bronze Powder— Brilliant gold coloured powders and lining manufactured from copper/zinc alloy (minimum 80 percent copper); powders are used for dusting on wet prints and linings are mixed with low acidic media for use as 'Gold' printing inks.

Bronzing Solvent — A strong reflection of a narrow band of wavelengths of light from the pigment surface as a vivid glare. It is entirely a surface phenomena.

Brook Field Viscometer — A rotational viscometer used for measuring the absolute viscosity of both Newtonian and non-Newtonian fluid (*see* Newtonian fluid).

Buffer Solution — A solution, the hydrogen ion concentration of which, and hence the acidity or alkalinity is practically unchanged by dilution. It also resists a change of pH on the addition of an acid or alkali.

Bulk Density— The weight of unit volume of material expressed in grams per litre.

Buttery Ink — A printing ink which is short but not tacky.

Caking on Press — Also termed 'piling'. Ink piles up on rollers and plates and does not distribute or transfer properly from printing plate to paper. The pigment in the ink, appears to remain behind on the plate in patches. The print locks uneven, but ink fills in halftone screens or small open spaces in letters.

Calender — A machine consisting essentially of a certain number of superposed rollers (bowls) of which only one is power driven.

Calendering — A process carried out by means of a calender on the partially dried paper or board fabric, destined to improve its surface finish or smoothness, thus controlling of calipre.

Capillary Action— It is a phenomena observed in liquids due to unbalanced inter-molecular attraction at the liquid boundary, for example, rise or depression of liquids in narrow tubes.

Capillary Viscometer — These are used for measuring viscosity of Newtonian fluids. Since the stress involved in this viscometer is due to the difference in fluid level between the two arms of the U, the density of fluid is taken into consideration, and the result is expressed as kinematic viscosity in Stokes.

Carbon Paper — Paper coated (generally on one side but sometimes on both sides) with a pressure transferable, highly coloured coating, which is a blend of oils and waxes. It is used for making copies at the same time as an original manuscript or typescript is made. For typing, a relatively hard and tough coating is required; for pencil carbons, a softer coating is preferable and for pen carbons, a still softer coating is necessary.

Carbon Paper Inks — There are various types of special inks used to manufacture carbon papers required by the copying or duplicating processes.

Cartridge Paper— A hard sized and strong paper generally free from loading and usually with a rough surface, substantially free from fluffing characteristics.

Catch Up— It manifests itself when the non-image areas of the plate starts to print. It first appears on the leading edge of the plate and also when the back edges of solid areas become uneven. It is caused mainly by improper ink water balance.

Cavitation Dispersers — High speed mixers consisting of a vertical shaft at the bottom of which is a dispersion rotor of saw toothed design. Used for premixing of low and medium viscosity materials.

Cellulosic Films — Transparent films based on cellulosic materials widely used for packaging. These films are coated with various polymers like nitrocellulose, polyvinylidene chloride, etc, to impart moisture and water resistance, heat sealability and gas barrier properties.

Chalking— A phenomenon manifested in ink film by the presence of loose removable powder, evolved from the film itself at or just beneath the surface. Chalking may be detected by rubbing the film with a finger tip or other means.

Cissing — A film defect in which a wet ink or varnish film recedes from small areas of the substrate surface leaving them apparently uncovered.

Cleaning— An operation intended to eliminate foreign matter unwanted in pulp, paper or board by physical means from the stock or raw material in the form of a suspension in water, that is, cleaning by gravity, centrifugal cleaning, cleaning by passing through orifices size, etc.

Cleanliness— Degree of freedom from the tendency of the sheet carbon or ribbon to transfer or bleed on to hands and paper in use and storage.

Clogging — Interruption in free flow of ink while writing.

Cloud Point — The temperature at which a homogenous liquid becomes cloudy or turbid, owing to separation in two phases when cooled under specified conditions.

Coagulation — 'The combination or aggregation of semi-solid particles such as fats or proteins to form a clot or mass. This can often be brought about by addition of appropriate electrolytes like addition of acid to milk'.

Cockling — The local deformation of a sheet of paper due to unequal shrinkage giving it a slightly crumpled appearance.

Coefficient of Viscosity— It is defined as the force in dynes required per square centimetre, to maintain a difference in velocity of 1 cm/s, between two parallel layers of the fluid which are 1 cm apart.

$$\eta = f/va$$

where

η = coefficient of viscosity,

a = area in square centimetres, and

v = velocity change in centimetres per second.

Colloid— A substance present in a solution whose particles are of large size and present in a dispersion medium, with properties distant from those of a true solution.

Colloid Mill — It has a truncated cone, which rotates inside a stator with a narrow clearance. They have high output and low maintenance cost. They are used for milling emulsions and thin pastes, but not of a viscosity above 100 p.

Collotype Ink— It is almost similar to lithographic ink, but instead is very stiff and fairly short. The ink must be based on a very clean working vehicle of excellent water resistance.

Collotype Procurs — The essential feature of this craft printing process is that it apparently gives continuous tone print of much finer detail than any half tone process. It is a very slow speed and short run process;

but accurate reproductions, for example, of art subjects can be made where delicate tone gradation of colour work is important.

Colour Bleed Resistance — A measure of the freedom from inter-mixing of the inks on multi-coloured ribbons or print.

Colour Strength of Pigment— The colour or tinting strength of a pigment is a measure of its ability to impart certain intensity colour to a system. Colour strength is usually measured by reduction with a standard white pigment in a suitable medium.

Colour Value— It is the strength of the colour.

Compatibility— Mutually miscible; get along well together.

Complementary Colours — Pairs of colours (light) that, when combined, give the effect of white colour.

Condensation— The change of vapour into liquid, which takes place when the pressure of the vapour becomes equal to the maximum vapour pressure of the liquid at that temperature.

Conical Bend Test Apparatus — This apparatus gives information on the flexibility of a printed or coated film on metal substrate by measuring the elongation potential of coated metal panels.

Consistency — The term indicates the viscosity, length or flow of an ink.

Contact Angle— This term is usually used for solid-liquid interface. It is the angle included between the tangent plane to the surface of a liquid and the tangent plane to the surface of a solid at any point along their line of contact.

Corrosion — Surface chemical action, especially on metals, by the action of moisture, air and chemicals.

Cosolvency— This phenomenon of cosolvency occurs when a mixture of two or more solvent/non-solvents (for a particular polymer) mixed in certain proportions forms a blend which dissolves the polymer.

Coverage of Ink— Total area of solid substrate that can be printed with a fixed quantity of ink.

Cracking of Oil— The method of decomposing mineral oils of high boiling point by heating them into more volatile oils.

Crawling — The retraction of wet paint or varnish from large areas of the supporting surface.

Crazing — The extension of fine cracks on, within or beneath the surface of an adhesive layer, formation of fissures, voids in a film due to shrinkage or solvent action.

Creeping — Flowing of ink beyond the limits of the design.

Cross Direction — The dimension of a paper or board at right angles to the machine direction (*see* Machine Direction).

Cure — To change the physical properties of a material by chemical action, which may be condensation, polymerization or addition usually accompanied by the action of either heat or catalyst or both.

Curling — The deformation of a sheet of paper or board, all over its surface which, therefore, tends to roll up into the form of a cylinder.

Curl Resistance — A measure of the tendency of sheet carbon or paper to be flat on exposure to varying conditions of temperature and humidity.

Dampening — Also known as 'Fountain Solution' used in lithographic printing process to keep non-image hydrophilic areas free from the ink and to maintain steady ink water balance.

Debout — Application of a ink film on a substrate with the help of a finger for shade comparison.

Deep Etch Lithographic Plates — Plates usually made of aluminium based alloy which are developed using photographic positives with the image etched into the plate. Such plates last longer during press run up to say 250 000.

Development of Ink— Deepening of impressions of writing or marking inks by oxidation.

Dehydrated Castor Oil (DCO) — Castor oil from which hydroxyl groups of fatty acids have been removed as water thereby introducing unsaturation in the hydrocarbon chain.

Diene Value — The estimation of two double bonds (diene) in unsaturated hydrocarbons.

Die Stamping — An intaglio printing process using engraved plates and a mole die replica of the engraving to achieve an embossed image.

Dilatent — A liquid whose viscosity increases with shearing rate.

Dilitho — The newspaper printing process, directly printing from a printing plate with image and non-image area, the latter kept damped with water or fountain solution.

Diluent — A non-solvent or poor solvent, for a vehicle that also reduces the viscosity of the vehicle.

Dimerized Rosin — Rosin is dimerized by heat polymerization in presence of a catalyst to get dimerized rosin. It has increased compatibility and improved hydrocarbon tolerance. Mainly used in gravure inks, gloss lacquers and for the manufacture of high melting resins.

Dispersing Agent — Chemicals that help dispersion or grinding of pigment in pigment vehicle system.

Dispersion — Two-phase system in which one phase, called the disperse phase, is permanently distributed as small particles through the second phase called the continuous phase.

Doctor's Blade — A scraper blade for regulating the amount of coating being deposited on a surface. It is also called 'Doctor's bar'.

Doping — Changing in the pressroom of the properties of an ink by incorporation of various modifying agents.

Dot Doubling — It manifests itself as a ghost, either in front of or behind the original half tone dot. This is caused by press defects.

Dot Gain — During multicolour wet on wet printing, a half tone dot printed on the first unit when exposed to the printing pressure of the blankets of the subsequent units, it is then possible for the dot to spread from its original figure. This causes the final colour print to lack depth, punch and snap. Dot gain is also influenced by lithographic balance.

Draw Down — A method of comparing the relative mass tone and under tone of two inks by drawing the inks placed side by side on a paper by drawing down with the help of a knife.

Driers — A catalyst which, when incorporated in small proportions, promotes drying by converting a wet ink film to a dry ink film.

Dry — The solid state of a film derived from a vehicle or ink after oxidation and polymerization or after the removal of a solvent. Also used to signify the condition of paper, pigment, solvent, etc, after the removal of water by evaporation.

Drying Oils — An oil, usually of animal or vegetable origin, having the property of hardening by oxidation to a tough film, when exposed in the form of a thin layer to air.

Drying Time — The time which elapses between the application of a printing ink and the attainment of a specified dry state.

Duplicating Stencil — A paper of a special structure impregnated and/or coated with a special suitable preparation for the re-production, by means of suitable equipment, of textual matters or patterns which have been impressed on it in such a manner as to permit the passage of an appropriate ink. The impressions are generally obtained by means of a typewriter or by hand with a special stylus or by a photo-chemical process.

Durability of Carbon Paper/Ribbon — A measure of the number of impressions that can be obtained from the same spot on a carbon paper or ribbon.

Dye Pigment — Dyes that by nature are insoluble in water and can be used directly as pigments without any chemical transformation.

Dyestuff — Coloured organic substances which are soluble in specific solvents/oils.

Edge Runner — A machine which can mix and, at the same time, break-up the actual pigment particles and rub only the aggregates. It employs two steel discs which are moved round on a circular track and scrapers return the materials to the track.

Edge Sealing — The method by which fraying of fibres at the edges can be prevented by application of a suitable coating.

Electrophotographic Papers — A special paper coated with zinc-oxide resin for use in electrostatic printing.

Electrolytic Tin Plate — The tinplate produced by the electrolysis of acidified solution of stannous sulphate containing cold reduced steel strip as cathode and strips of tin as anode.

Embossing — The process of embossing (to cover with raised work) is a method of impressing a desired design on to a material by the use of a die.

Emulsion — A suspension of extremely fine droplets of one liquid in another immiscible liquid.

Emulsification of Litho Inks — In lithographic printing ink, water comes into intimate contact and litho inks take up limited amount of water which remain in finely dispersed state. The ink should not tend to form an oil-in-water emulsion which will affect the ink performance resulting in inferior quality prints.

Emulsifying Agent — A surface-active substance which helps to produce a stable emulsion. Emulsifying agents generally consist of lipophilic groups combined in the same molecule with hydrophilic groups and they orientate

themselves at the interfaces between the dispersed and continuous phase and thereby helping to form a stable dispersion.

Emulsion Ink — A composition comprising pigments, modifying agents, and an emulsion of two immiscible liquids.

Epoxide Ester — The reaction product of epoxy resin and long-chain fatty acids, such as linseed, soya or dehydrated castor oil.

Epoxy Resin — A condensation product of bisphenol with epichlorohydrin which is produced in a wide range of molecular weight, melting points and viscosities.

Equalizer Rod — A metal rod wound with a fine wire around its axis so that ink can be drawn down evenly and at a given thickness across a piece of paper. It is also called meyer rod or bar.

Eradicator — An ink removing compound.

Eraser — Any article used to remove ink impressions by mechanical means, such as pen knife or rubber.

Erasibility — Ease with which the image may be removed without impairing the surface of the paper.

Ester Gum — A resin produced by esterification of rosin with glycerol.

Evaporation — The conversion of a liquid into vapour, without necessarily reaching the boiling point.

Extenders — Transparent colourless pigments, transparent colourless ink, vehicle or solvent that change very little the appearance of an ink but do lower the colour strength of same. Frequently used to lower cost or improve the body and printing qualities of an ink.

Fading — The destruction of colouring matter in an ink film surface as a result of ageing, weathering or exposure to sunlight.

Fanals — A group of pigments formed by the reaction of basic dyestuffs with complexes of phosphoric and tungstic acids, phosphoric and molybdic acids or all three acids.

Fat Resistance — Inks resistant to fats are used for the printing of wrappers for butter, cooking fat, usages and similar materials.

Feathering — The irregular spread of ink around printed area or on either side of the line drawn with a writing ink.

Filling In— A printing defect where small recesses in type and half-tone illustrations become filled up with semi-solid matter and printing is impossible without cleaning the printing machine.

Fineness of Grind — The fineness of grinding or dispersion of pigment in a vehicle. This can be measured with special gauges like Hegman Gauge.

Flaking — Breaking away of the complete coating including primer, undercoat and finish from small or large areas of the surface to which the system has been applied.

Flash Point— The lowest temperature at which a combustible liquid will give off sufficient vapours that will burn momentarily. This is an arbitrary figure depending on method of test.

Flat Bed Machine — A letter press machine used for book work and many types of commercial printing and is normally sheet fed. The type form is carried on the "bed" of the machine which has a reciprocating motion, and pressure is provided by a cylinder.

Flexography — It is a branch of rotary typographic printing in which the printing is done from flexible relief plates with fluid, volatile inks which dry rapidly by evaporation.

Flocculation — The development of loosely coherent solid aggregates in a pigment-vehicle dispersion.

Flong — Paper or board used for making the mould for casting stereotypes.

Flow Cup — Usually used to compare the consistencies of substances like paints, inks and lacquers. These cups have a conical bottom with wide orifices.

Fluff — Loose particles removed from the surface and edges of dry sheets of paper by agitation or rubbing.

Fluorescence — Capable of converting invisible light rays such as ultraviolet rays into visible light.

Fluorescent Pigment — These are most brilliant of modern colours and this brilliancy is due to their ability to absorb radiation and re-emit the energy at longer wavelengths.

Flushing — A process where water from the pigment surface, present in the aqueous slurries of pigments, is directly displaced by the selective medium. The pigment particles are dispersed directly into the varnish and require no grinding.

Flutes — The corrugations in a corrugated paper or board.

Fly — *see* 'Misting'.

Flying — This term is applied to the effect produced when small droplets of inks are thrown out from nips of inking rollers of a printing machine and can spread via air in the whole press room colouring all objects.

Folding Endurance — Number of double folds, in opposite directions at the same place which the paper, under specified tension, can stand up to the point when it ruptures.

Foots — Raw linseed oil contains impurities, such as carbohydrates, waxes, phosphatides and suspended mucilage which are known as 'foot's'.

Foreign Matter — Any matter which is not an ingredient of the ink.

Fountain Solution — Plain water or treated water which are used in lithographic printing process for separating printing and non-printing areas of a lithographic printing plate by getting absorbed in the non-printing area is known as fountain solution.

Fraying — The paper or cloth becoming ragged at the edges.

Fugitive — Lasting a relatively short time.

Fugitive Ink — Ink that leaves no trace of itself on paper due to the action of light and moisture or chemical treatment.

Fungicide — A substance capable of destroying harmful fungi, such as moulds and mildews.

Furnish of Paper — Cellulosic substances being used for the manufacture of paper.

Fusion — The conversion of solids into liquid state by means of heat.

Gardner Viscometer — It is a rapid and fairly accurate method of measuring the viscosity and is known as Gardner 'air bubble' test. The apparatus consists of a number of glass tubes of accurate bore and uniform length which are filled with stable oils of specified viscosities and sealed. A small air space is left at the top of each test tube, thereby forming an air bubble when the tube is inverted. The sample under viscosity test is compared against the standard tubes of known viscosities and viscosity figure can be readily ascertained.

Gel Point — The stage at which a liquid begins to exhibit the properties of gel.

Gelling Agent — Chemical compounds which, when incorporated into the ink system, increases the consistency of the ink considerably. Excessive use of these compounds can lead to unusable product.

Gel Time — The time required to convert a liquid composition into a gel under specified conditions.

Ghost Image — The faint repetition of the designs on the printed areas. This can also be with white prints and camco lettering, which form a ghost image with a larger area.

Ghosting — The formation of cloudiness in the printed areas.

Gilsonite — A natural asphalt and found as mineral gilsonite with high melting point and hardness. It is soluble in hydrocarbons. Gilsonite is used as a vehicle for black inks mainly for cheap inks.

Glassine Paper — Paper obtained from a highly hydrated-pulp and subsequently highly super-calendered. It is translucent and may be coloured or rendered opaque in the stock. It is very smooth and shiny on both sides and subsequently grease-proof.

Glazed Paper — Paper which has undergone the process of glazing.

Glazing — The operation of imparting a lustre to the surface of paper by means of any appropriate drying or mechanical process.

Gloss — The degree to which a printed surface possesses the property of reflecting light in a mirror like manner (specular reflection). The extent to which this property is developed depends on the ink composition and type of substrate on which the ink is printed, and it ranges from dead flat to full gloss.

Grain of Offset Plate — A mechanical process intended to increase the area of metal exposed also greatly increase the rate of chemical reaction at the surface. The graining of metal greatly helps the plate to retain a film of water during offset printing.

Gravure Process — A process of printing from engraved surfaces. The important branches of gravure printing are the copper and steel processes, the steel die stamping process and photogravure and rotary photogravure processes.

Grease Proof — Applied to synthetic films, paper and ink films that are resistant to the action of fats and greases.

Greasing—Undesirable adhesion of ink to the non-printing areas of a lithographic plate.

Greyness — The purity of a colour is judged by its freedom from grey. Colour becomes grey when they reflect less light of predominant colour than the paper that the colour is printed on.

Grey Scale — An internationally accepted standard scale which is used in assessing the change in colour and staining.

Grinding Gauge — An apparatus for measuring the fineness of pigment dispersion in the ink vehicle. Different types of gauges are available, for example, Hegman, Ault and Wiborg, Hipiri, etc, for testing the fineness and the readings can be converted to the micron scale. These gauges essentially consist of a block of hardened steel into which a shallow groove is drawn varying in depth from zero at one end to either '001 inch or '002 inch at the other. A sample of ink is placed at the 'deep' end, and drawn towards the shallow end by a steel scraper. Presence of any bittiness or scratches in the ink film is observed and the distance at which they occur is noted.

Gumming — An operation consisting in applying a layer of adhesive to the whole or a part of one side of paper or board with a view to its subsequent use after moistening.

Halftone Process — For successful reproduction of photographs or artwork, the appearance of graded tones can be obtained only by dividing the printed image into small elements of varying size. In halftone process, a very light tone is represented by very small pin point dots, and a very dark tone by a almost solid area. Intermediate tones are represented by dots of different size between these two limits.

Halo Effect — Piling up of ink at the edges of printed letters and dots. Also coloured or sometimes uncoloured areas adjacent to them caused by spread of coloured or uncoloured vehicles.

Hanging Back in the Duct — The ink which does not flow from the ink duct to the roller properly under normal conditions without agitation is known as hanging back in the duct.

Hectograph — It is a type of reproducing media, wherein the transferred impressions obtain its colour through chemical media.

Heat Set Ink — A special type of quick drying ink system where the mineral oil evaporate from the print by the application of heat and the resin/pigment mixture immediately sets by passing over chilled rollers. The heat is applied either by gas burners or by passing the printed paper over steam-heated drums.

Hegman's Gauge — See Fineness of Grind.

Hold Out of Inks — The quality of the ink to remain on the top of the paper stock without being absorbed to a considerable extent by the paper pores and thereby exhibiting a high degree of gloss on the dried ink film.

Hot Carbonizing Inks — This special type of wax based carbon copying ink is applied to paper by letterpress printing machine where ink reservoir and part of the machine is heated to melt the wax. The print of this ink will transfer under pressure to the paper below like carbon paper.

Hue — A visual property determined by the dominant light wavelengths reflected or transmitted.

Hydrocarbon Resin — Polymerization product of olefins at elevated temperatures using catalysts. The monomers are prepared by cracking petroleum fractions. These are chemically inert having acid and saponification values less than 3.

Hydrocarbon Solvents — Long chain non-polar, aliphatic and aromatic organic compounds of carbon and hydrogen used as solvent. They include, toluol, xylene, white spirit and mineral oils.

Hydrophilic — Having a strong affinity for binding or absorbing water.

Hydrophobic — Antagonistic to water; incapable of dissolving in water.

Hydroxyl Value — The number of milligrams of potassium hydroxide required to neutralize the acetic acid which can combine with 1 g of the oil on acetylation.

Hygroscopic — The process of absorbing or attracting water from the atmosphere.

Ignition Point — The minimum temperature required to initiate ignition.

Indelible Ink — Ink, the impressions of which are resistant to chemical treatment.

Indian Ink — Black ink containing a suspension of carbon. This is also known as 'Chinese Ink'.

Induction Period — The initial period of drying an oil during which no perceptible physical changes take place in the oil.

Infrared Heating — An accelerated drying system where the printed sheets are subjected to radiated heat rays of different wavelengths which increases the setting action of the ink, while final drying is completed much more rapidly in the stack.

Inkometer — An instrument for measuring the tack values of different ink systems. The instrument is provided with a range of speeds and temperature control system. The value of the tack is mentioned by inkometer units.

International Blue Wool Scale — The scale uses assessment of light fastness. It is numerically coded 1 (very low light fastness) to 8 (very high light fastness).

Intaglio Process — In this process, the ink is held in etched or engraved lines or cells in a metal plate so that it is below the surface from which it is applied.

It is based on the principle that if lines are etched or engraved on a metal plate and a sheet of paper is forced under pressure into the lines of the engraving, prints can be obtained. It is of three types:

- a) Copper plate and steel plate engraving,
- b) Photogravure and rotogravure, and
- c) Die-stamping

Iodine Value — The number of grams of iodine absorbed per 100 grams of oil or resin, which is the percent iodine absorbed. The iodine value gives an indication of the degree of unsaturation of the constituent fatty glyceride or the resin.

Jobbing Inks — These inks are generally used for printing small order jobs, either by letterpress or offset printing process, for example, hand bills, letterheads, programmes, advertising leaflets, etc.

Keying of Ink — The property of an ink to adhere to the substrate or to the previously printed ink film.

Kauributanol Value — It is a method for determining the aromatic content of hydrocarbon solvents. The method consists in adding the solvent slowly, from a burette, to a standard solutions of Kauri resin in *n*-butanol until the mixture just turns cloudy.

Ketone Resins — These are the condensation products of cyclic ketones and formaldehyde in the presence of alkali catalysts. Ketonic resins have very low iodine, acid and saponification values and good solubility in most solvents used in printing inks except aliphatic hydrocarbons. They are used in flexographic and gravure inks where good gloss and chemical resistance are required.

Lake — The pigment that results when a soluble dye is converted into a pigment in the presence of an inorganic white base such as alumina hydrate or white gloss.

Lamination — The process of combining dissimilar materials such as paper, foil and films into more functional and high valued product to impart properties meeting end use requirements. The various lamination processes are: adhesive lamination, thermal lamination, hot-melt lamination, extrusion lamination and coating, and co-extrusion.

Laray Viscometer — The instrument is used to determine the viscosity of letterpress and offset inks in poise. In Laray viscometer a round metal bar is allowed to fall through an aperture filled with ink sample under its own and additional weights. The time of fall is used to draw a rheological diagram from values for viscosity and yield value are obtained.

Length of Ink — It is the relative ability of the ink to flow. This property is governed by the formulation of the ink and its measurement is empirical.

Letterpress Process — The method of printing from a raised surface or type line and halftone blocks. Several types of letterpress printing machines are available, namely, platen, flat-bed cylinder and rotary.

Light Stability — Resistance to change in colour of the image exposure to atmosphere.

Light Fastness of Inks — The behaviour of the dried ink film when exposed to light and the degree of resistance given by the film to the attack of UV rays is known as light fastness of ink. Light fastness property depends on the nature of the pigment used and also on the atmospheric conditions. Inks for printing jobs which are exposed in outdoor conditions should have good light fastness property.

Linting — The deposition of paper fluff, dust and coating on offset press blankets during printing is known as linting.

Lithography — Printing from a planographic or flat surface in which image and non-image areas are chemically different.

Livening — A progressive thickening in the consistency of an ink or varnish to a stage where it is unsuitable for application.

Machine Direction — The dimension of a paper or board, corresponding to the direction of the flow of the stuff on the paper machine.

Magnetic Inks — Inks that contain pigments which are magnetic in nature.

Maleic Resins — The reaction product of maleic anhydride and rosin. A wide range of resins of this type are available which vary in melting point, acid value and solubility properties. They are mainly used in flexographic, gravure and letterpress inks.

Melamine Formaldehyde Resin — A generic term used to denote the condensation resins made by the reaction of amines with aldehydes.

Manifolding — A measure of the intensity and sharpness of the image as a function of the number of carbon copier produced in one typing or writing.

Mass Tone — The colour, by reflected light, of a bulk of the ink.

Maturing of Ink — The change in the ink characteristics after certain period of storage.

Melting Point — The constant temperature at which the solid and liquid phase of a substance are in equilibrium at a given pressure. It is usually quoted at standard atmospheric conditions.

Micron — One millionth of a metre; approximately one twenty five-thousandth (0.000 004) of an inch.

Micronised — Reduction of solids particles to the smallest size.

Mileage — *See Coverage.*

Misting — Tiny ink droplets travelling away from the rotating press rollers and depositing themselves on areas adjacent to or on other parts of the press.

Moisture Set Inks — The inks based on the principle of precipitations drying, that is, resin is thrown out of solution and forms a film with pigment in presence of moisture. This may come from one or more of these sources, the atmosphere, an applied steam or from the moisture present in most papers and boards.

Moon Scotch Value — The property of a pigment that provides the endurance to friction.

Mottling — Irregular and unwanted variation in colour and gloss caused mainly by uneven absorbency of the substrate.

News Inks (Rotary Letterpress) — Inks used for printing daily newspapers. News inks are relatively low viscosity and are generally totally based on mineral oils. These are, therefore, completely non-drying in nature and depends on penetration for drying.

Newtonian Fluid — A fluid in which shearing rate is directly proportional to the applied force.

Nigrometer Index Value — This serves as a value for the colour density of carbon black. Low values indicate high density and *vice-versa*.

Offset Lithography— A planographic printing process in which the image on the printing is transferred to an intermediate surface, a blanket in offset printing, before being printed on substrate.

Offsetting of Inks — See 'Set-Off'.

Oil Absorbtion — The number of millilitres or grams of oil used to bind together 100 g of pigment under specified conditions of test. The figure is not absolute, but depends on method of determination.

Oil Halation — The process of spreading of oil beyond its proper boundary.

Oleoresinous Varnishes — The reaction products of drying oils and resins. They are usually prepared at elevated temperatures and used for making letter press and offset inks.

Opacity — The hiding power of the pigment and is generally assessed by applying a film of ink of standard thickness on a sheet of paper with a black strip. The higher the opacity of the pigment the black strip under the ink film will be less visible.

Overprint Varnish— A transparent varnish applied as an overcoat on a printed substrate to impart gloss, scuff and rub resistance.

Parchment Paper — Paper that has acquired by the action of sulphuric acid, a continuous texture. The texture gives it both high degree of resistance to penetration by grease and renders it resistant to disintegration by water even at boiling point.

Pearling — A common trouble in gravure when there is distinct print with crepe pattern.

Pebble Mills — The design is same as ball mills but in pebble mills the grinding medium is pebbles or porcelain balls and the mill has a lining of porcelain.

Penetration — The visible effect seen on the reverse side of the sheet due to diffusion of ink or its components into or through the paper.

Penetration Drying — This is the drying of an ink film by absorption due to the capillary action of the narrow spaces between fibres of the paper.

Permanent Ink — Ink which show no appreciable fading of impressions when exposed to day light, ultra-violet rays and when immersed in water and alcohol.

Peroxide Value— The number of millilitres of 0.002 normal sodium thiosulphate required to titrate the iodine liberated by 1 g of the oil.

pH — The common logarithm of the reciprocal of the hydrogen ion activity in grams per litre of an extract, usually in water. In water, pH is absolute neutral, less than 7 is acidic and more than 7 is alkaline.

Phase — A phase is a separate part of a heterogenous body or system.

Phenolic Resin — The reaction products of phenols or substituted phenols and formaldehyde solution in presence of a catalyst. These resins are available in oil soluble and oil reactive forms and are used for making varnishes.

Phosphorescent Inks — These are based on inorganic phosphorescent pigments and the ink film has a characteristic 'glow' when light falls on the surface.

Picking — Detachment of coating, film or fibres from the surface of paper or board.

Pigment — Finally ground solid material, insoluble in the media that imparts colour to an ink.

Piling — Defects in printing due to lack of proper flow, or poorly dispersed pigment particles in the ink. The ink does not distribute properly and tends to pile up.

Pin Holes — The formation of minute holes in ink film during printing and drying.

Pinking — Bleeding of marking ink when the marked cloth after 24 hours is stacked between materials at room temperature.

Piping — The corrugated effect produced in paper inadvertently due to irregular tension during reeling or the effect of humidity.

Plasticiser — A material added to increase the flexibility or plastic flow properties.

Plastic Viscosity — A property of materials which flow only when a shear stress above a minimal value is applied.

Ply (of Paper or Board) — One of the separate layers of homogeneous composition which together make up the multi-layer aggregate.

Poise — A unit of dynamic viscosity in C.G.S. units. It is defined as the tangential force per unit area (dynes per square centimetre) required to maintain unit difference in velocity between two parallel planes separated by one centimetre of fluid.

One Centipoise = 10^{-8} Newton second per square metre (the SI unit of viscosity)

Polishing of Plates — It is a defect associated with offset lithographic printing when edges of images on plate show signs of wear and printing become dull and lacks depth.

Polyamide Resin — The polycondensation reaction products of dibasic acids with diamines, used in flexographic and gravure inks.

Polyesters — The polymers formed by the condensation of ethylene glycol and terephthalic acid. Polyester films are extensively used in packaging industry because they are tough, has excellent impact resistance, very low moisture absorption and dimensionally stable under extremes of temperature and humidity. Polyester resins are needed for metal decoration and other printing inks applications.

Polyethylene Waxes — Synthetic waxes prepared by polymerizing ethylene at controlled conditions. Polythene waxes are white, odourless, chemically very inert with variable hardness and softening point.

Poster Paper — A variety of paper which has been machine glazed, suitable for printing posters, labels, etc.

Powdering — The defect, when an ink film, after completion of standard drying time, can be rubbed off by finger-pressure in the form of a powder.

Preservative — Substances used to prevent fungus growth, for example, formaldehyde and carbolic acid.

Primary Colours — The colours chosen for the subtractive colour mixing principle of printing inks are complimentaries of the additive colours, blue, red and green. The primary colours are: a bright primrose yellow, a greenish blue (cyan) and a blue shade red (Magenta).

Printability — A term used in ink testing that yields smooth dense solid areas and at the same time sharp and clean screen areas using a high grade printing paper.

Printed Circuit Boards — These boards are made by laminating a thin copper foil to a hard non-conducting base line bakelite. Circuits are then drawn on the copper foil with an acid resist ink by silkscreen printing process. These boards are extensively used in electronic industry.

Printing Strength — A relative value indicating how much ink required to give an equal depth of tint to a definite amount of white ink as compared with the same amount of a standard ink of the same consistency.

Process Inks — The principle of process ink printing depends on the use of three primary colours and a black to reproduce a wide range of colours.

Pseudo Plastic System — The material which is having a variable apparent fluidity and no yield value.

Rancid — The process of an oil being acidic on standing.

Recouperation — This term is used for typewriter ribbon which describes the flow back property of the ink in the portion of the ribbon from where the ink has been used up.

Reducer — An additive compound used for reducing the consistency of ink to improve its workability.

Reference Ink — Standard inks as laid down in the specifications for comparison.

Relief Printing — The ink transfer process from the raised surface to the substance. Letterpress and flexographic printing come under this process.

Reticulation — The crepe-like appearance of the surface of the colloid on collotype plates.

Rheology — The branch of science which covers the flow properties.

Roller Coating — They are free flowing lower viscosity compositions suitable for roller coating application to sheet materials, and gives tack free hard finish after stoving at recommended temperature.

Rub Test — Rub test is a method of assessing the abrasion resistance property of the ink film. PATRA rub-tester is a motor driven machine which is widely used in printing industry to check the rub resistance or abrasion resistance property of the ink film.

Sand Mill — A dispersion mill based on the principle of Attritor using smaller size grinding media viz. sand, beads or shots, where the increased number of contact points leads to faster dispersion.

Screen Process Printing — It is a process of forcing a short, soft and less tacky ink, through the open meshes of a screen or fabric on which the design desired to be reproduce is left open, while the parts not to be printed are blocked. Silk, nylon and stainless steel screens are used for printing jobs.

Scotch Tape Test — This test is done for adhesion. Cellophane adhesive tape is fixed on to the print. The paper and the tape are firmly held with one hand and the tape is pulled back slowly for half the length and then

snatched rapidly. The print is examined for any failure due to lack of ink adhesion and the lack of the tape for ink transfer.

Scouring — Washing of cloth to remove greasy matter.

Scumming — In lithographic offset printing scumming manifests itself, when the non-image areas of the plate begin to print.

Security Printing — The printing of paper currency, cheques and other security documents either by using special printing methods or specially formulated inks to resist forgery is known as security, printing.

Sediment — All undissolved matter that may be found at the bottom or on the walls of the container as well as suspended in the body or on the surface of the fluid ink.

Sedimentation — 'The settling down by gravity of the solid particles in suspension'.

Serigraphy — Screen printing is also known by this name.

Set Off — Appearance of impressions on the back of the printing sheet when stacked after printing being picked up from the printed sheet.

Setting — The partial drying of an ink film by slight absorption of the vehicle by the paper.

Shade — Described as a gradation of colour resulting from the addition of a small amount of black or a complimentary colour. In ink manufacture, used incorrectly as a synonym for hue.

Sharpness — Similarity of the geometry of the image of the type face.

Shelf-Life — The time that an ink will keep in good condition when stored in original sealed containers, under normal storage conditions.

Show Through — Due to lack of paper opacity, the ink soaks into the paper sufficiently making it transparent and the printing is seen on the reverse side of the paper as a shadow image.

Sieve Residue — This is the percentage of grit present in a pigment.

Silking — This term is applied to the appearance of a very fine wrinkle in the surface of the varnish film.

Sizing of Paper — The addition of materials either to the stock (engine sizing) or to the surface of the paper or board (surface sizing) in order to increase its resistance to the penetration of aqueous liquids, particularly writing inks, and to the resistance of surface spreading of such liquids.

Skinning — The formation of surface film due to oxidation of inks in the container.

Slip Resistance — Resistance of sheet carbon to slippage when placed between multiple sheets of copy paper.

Slur — Smudging of the half tones occurs at the edge, usually furthest from the grippers. The dots enlarge and highlights are cloudy. It occurs due to slight movement between paper and forme.

Slurry — A thin suspension of a solid in a liquid.

Smudge — The disfigurement by handling of not fully dried writing or print impression.

Solvent Release — Refers to the ability of a binder to influence the rate of evaporation of a solvent when the ratio of the binder to solvent is large.

Solvents — The organic liquid, with fixed boiling range and specific gravity, which are used to make solution of resins, oils and dyestuffs. Different types of solvents are available depending on their chemical composition and are extensively used in printing ink formulations.

Specific Gravity — The ratio of the weight of a given volume of an ink to the weight of an equal volume of water.

Spreading — *See* Feathering.

Spirit Varnishing — Resin solution in spirit, when applied over a print to give a glossier top surface, the process is known as spirit varnishing. Spirit varnish is applied over the print by roller coating.

Squash — In letterpress printing, a deposition of ink film on the edge of print is observed because here the printing form is pressed against the paper at a pressure. This deposition of the ink film at the edge is characteristic to L/P printing only and is known as 'Squash' marks.

Stability — Resistance to deterioration of quality during storage.

Streaking — A printing ink problem, which can be due to cylinder, coarse particles in the ink, paper coating dust and nicks in the doctor blade.

Strike Through — The penetration of the vehicle of the printing ink through the sheet.

Stripping — When steel rollers refuse to accept ink resulting in an uneven ink distribution and appearance of bare surfaces on steel rollers, the defect is known as rollers stripping.

Substance of Paper — Weight of a given specimen of paper in gram per square metres under standard atmospheric conditions. It is also called 'Basic Weight'.

Subtractive Process — The process of producing colours by mixing three different dyes or pigments together. The final colour is produced by the absorption of different wave-lengths of light.

Surface Active Agent — *See* Wetting Agent.

Surfactants — *See* Wetting Agent.

Suspension — A two-phase system consisting of very small solid particles distributed in a liquid dispersion medium.

Sympathetic Ink — A writing fluid which yields impressions that remain invisible until heated, treated with some suitable reagents or exposed to certain rays.

Tack — Stickiness; resistance of an ink film to being split.

Tendering Effect — Loss in breaking strength of a fabric by chemical action of marking ink.

Tensile Strength — The limiting resistance of a test piece of paper or board submitted to a breaking force applied to each of its ends under the standard conditions of test. The tensile strength is generally expressed as breaking strength.

Texture of Pigments — It indicates the relative hardness and softness of pigment particles and also the relative ease with which the pigment may be dispersed in the vehicle.

Thermographic Printing — The method of producing a raised effect on the printed surface by dusting a freshly printed ink surface with a fusible resin and heating, so that the resin fuses and adheres to the ink. This method gives a raised impression and is mainly used for letterheads and cards.

Tint — Colours that have the same hue but different saturation.

Tinting Bases — Transparent colourless inks used by the printer to reduce the strength of the inks or to make transparent shades.

Tinting Medium — An almost transparent substance of the consistency of printing ink but of negligible colour value.

Tintorial Strength — The degree to which a colour pigment or ink imparts colour to a white pigment or ink under defined conditions of test.

Tinting in Lithography — A printing defect associated with the lithographic printing process and is characterized by the presence of a faint background of colour in the printed sheet and this is particularly noticeable in the non-printed regions. This may happen when the pigment tends to wash out of the ink vehicle and forming a dispersion in water and which, in turn, forms 'tinting'.

Tissue Paper — A fine, thin strong paper, made from rag and hemp and cellulosic fibrous materials with a close and even formation, and of a substance usually below 25 gram per square metre.

Toner — A colouring agent which helps in boosting up the intensity of a particular pigment.

Top Tone — *See* Mass Tone.

Total Solids — Residue left after evaporation of the volatile content of a ink.

Toxicity — The effect produced by substances which are harmful to the human body.

Trapping — The ability of a printed ink film to accept the overprinting ink and forming a desired uniform colour combination.

Trichromatic Process — Coloured prints which are produced by printing yellow, magenta and cyan inks and without the use of black ink is known as trichromatic or three colour process.

Turbidity End Point — The volume of solution delivered during titration when there is change in the turbidity of a solution.

Tung Oil — Tung oil or chinawood oil is extracted from the particular seeds, pale straw coloured with a characteristic odour. Due to the presence of three conjugated double bonds, the oil dries very quickly in presence of air. The pure oil gels in about 12 minutes when heated at 276°C. Tung oil is used for making oleo-resinous varnishes.

Two Can Inks — The reactive ingredient of an ink is supplied in a separate container and mixed with the remaining quantity of the ink before printing. These inks are commonly known as two can or two pack inks. The mixed ink will have a limited pot life and should be used within the specified time.

Under Tone — This is the shade of an ink revealed when light is allowed to travel through the thin film of ink, reflected from the paper surface, and traversed the film again. Undertone of an ink gives a close idea about the actual shade that will be obtained during printing and it is more important than top tone (mass tone) at printing film thickness.

Urea Formaldehyde Resin (UF Resin) — This resin is prepared by condensation of urea with formaldehyde in definite proportions and maintaining an alkaline condition. For use in printing inks alkylated UF resin is used which is easily soluble indifferent solvents. UF resin finds use in two pack acid catalyzed airdrying system and also in stoving or thermosetting inks in combination with other resins.

U-Tube Viscometer — These viscometers are widely used to measure the viscosity of oils and varnishes. The viscosity figure obtained directly from this method of measurement is in ' Stokes ' units. A number of U-shape viscometers are available to cover a wide range of oils and varnishes with different viscosities.

Varnish — A homogeneous clear fluid, consisting of solvent, resin and or drying oil, which forms major component of an ink vehicle.

Vat Dyes — These dyes are characterized by their insolubility in water.

Vehicle — A fluid composed of varnish, waxes, driers and other additives that carries the ink colourant (pigment), controls the flow of the ink or varnish on the press, and after drying, binds the pigment to the substrate.

Wash Coating -- A coating of a dilute shellac solution in alcohol is applied on the aluminium foil to improve ink adhesion as well as to preserve the foil.

Washable Ink — Ink, the impressions of which are easily removed by simple treatment of soap and water.

Water Proof Ink — Ink, which is resistant to water.

Wet Grinding — Process of grinding or dispersing pigment in liquid medium.

Wetting Agent — A substance which has the ability to disperse or to stabilize dispersion under appropriate conditions.

Wet or Wet Printing — In multi-colour printing when superimposition of one colour over other is accomplished before the colours are dry. This process of printing of one colour over the wet film of the other colour is completed rapidly.

Writing Ink — Inks which are clear, aqueous solutions, free of sediment, dry satisfactorily on the paper without striking through and does not cause undue corrosion to the pen nib which is to be used.

Xerography — A method of forming an image by electrostatic transfer method and xerography is like a photographic process in which the pigment fusion mixture acts as the developer. The process has been mechanized and is used in connection with computers and for preparing copies of printed books quickly.

Yield Value — The minimum force required to start an ink flowing. This phenomena is an attribute of rheology.

Z-Arm Mixers — A kneading type mixer where the mixing arms are designed like 'Z'. This mixer is generally used to mix heavier-bodied materials.

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